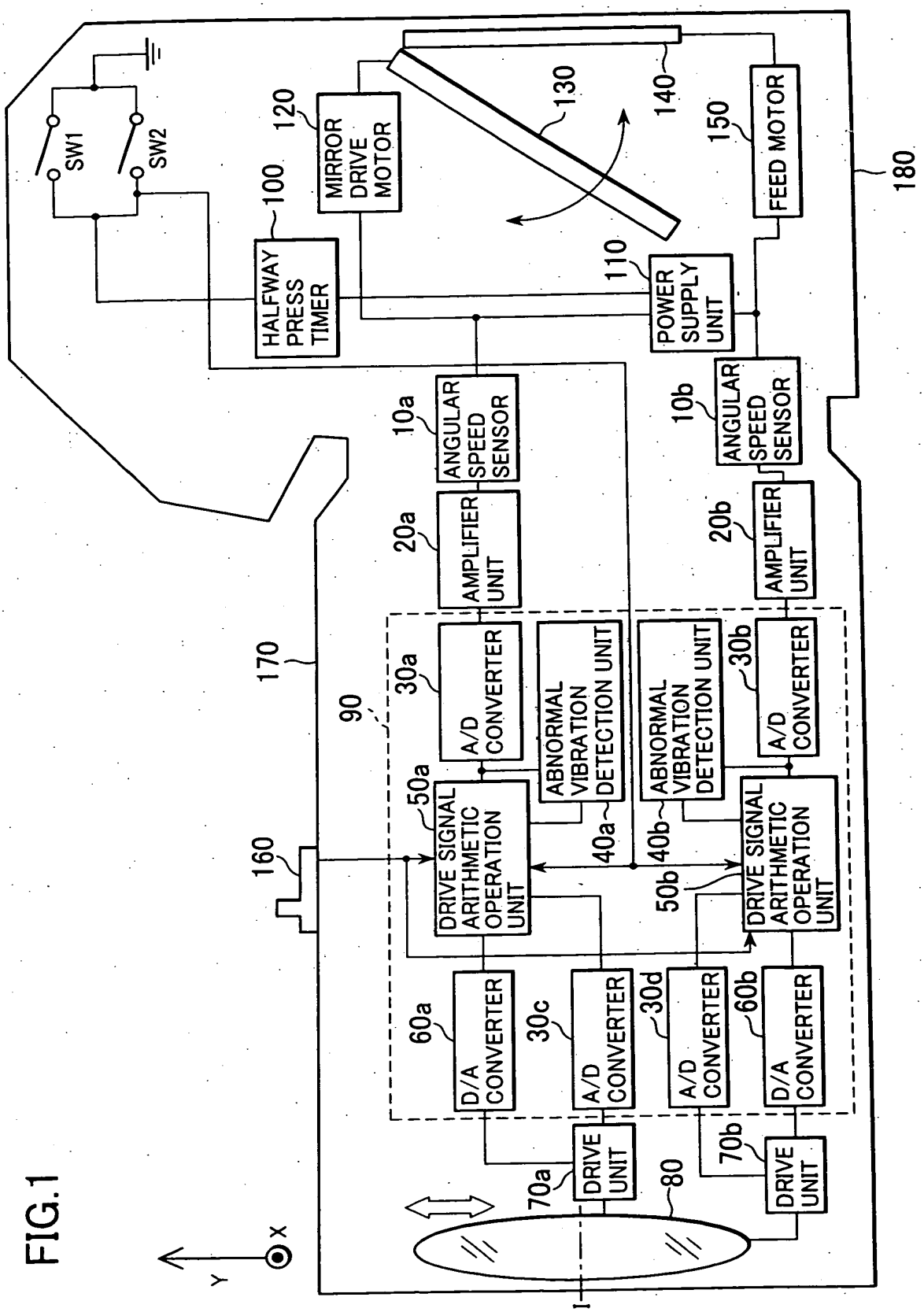
FIG.1


SW1
SW2
100
HALFWAY PRESS TIMER
120
MIRROR DRIVE MOTOR
130
140
150
FEED MOTOR
180
110
POWER SUPPLY UNIT
10a
ANGULAR SPEED SENSOR
10b
ANGULAR SPEED SENSOR
20a
AMPLIFIER UNIT
20b
AMPLIFIER UNIT
170
90
30a
A/D CONVERTER
ABNORMAL VIBRATION DETECTION UNIT
ABNORMAL VIBRATION DETECTION UNIT
30b
A/D CONVERTER
50a
DRIVE SIGNAL ARITHMETIC OPERATION UNIT
40a
40b
50b
DRIVE SIGNAL ARITHMETIC OPERATION UNIT
160
60a
D/A CONVERTER
30c
A/D CONVERTER
30d
A/D CONVERTER
60b
D/A CONVERTER
70a
DRIVE UNIT
70b
DRIVE UNIT
80
X
Y
I
I

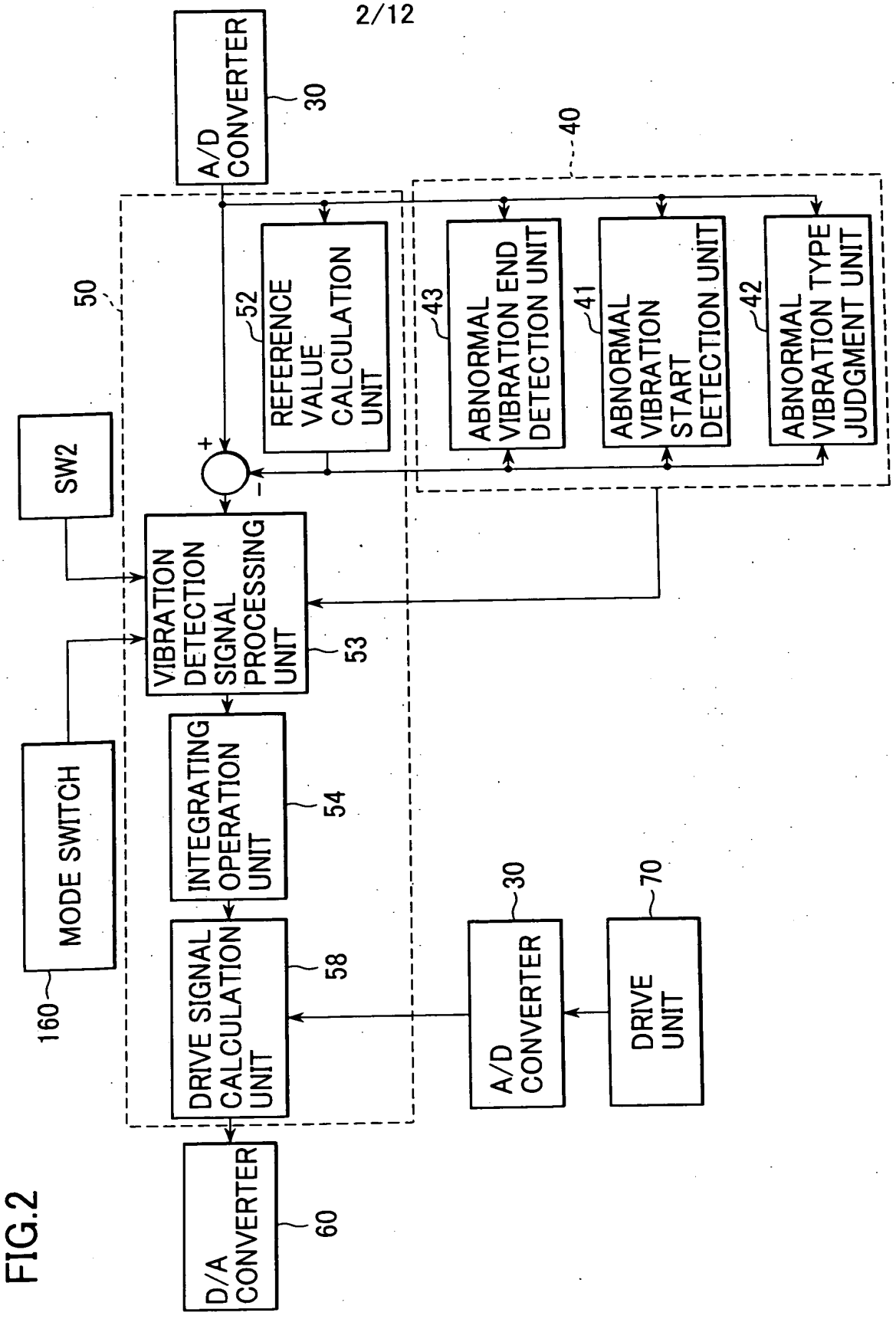

A/D CONVERTER
30
40
50
REFERENCE VALUE CALCULATION UNIT
52
ABNORMAL VIBRATION END DETECTION UNIT
43
ABNORMAL VIBRATION START DETECTION UNIT
41
ABNORMAL VIBRATION TYPE JUDGMENT UNIT
42
SW2
+
-
VIBRATION DETECTION SIGNAL PROCESSING UNIT
53
MODE SWITCH
160
INTEGRATING OPERATION UNIT
54
DRIVE SIGNAL CALCULATION UNIT
58
A/D CONVERTER
30
DRIVE UNIT
70
D/A CONVERTER
60

FIG.2

FIG.3

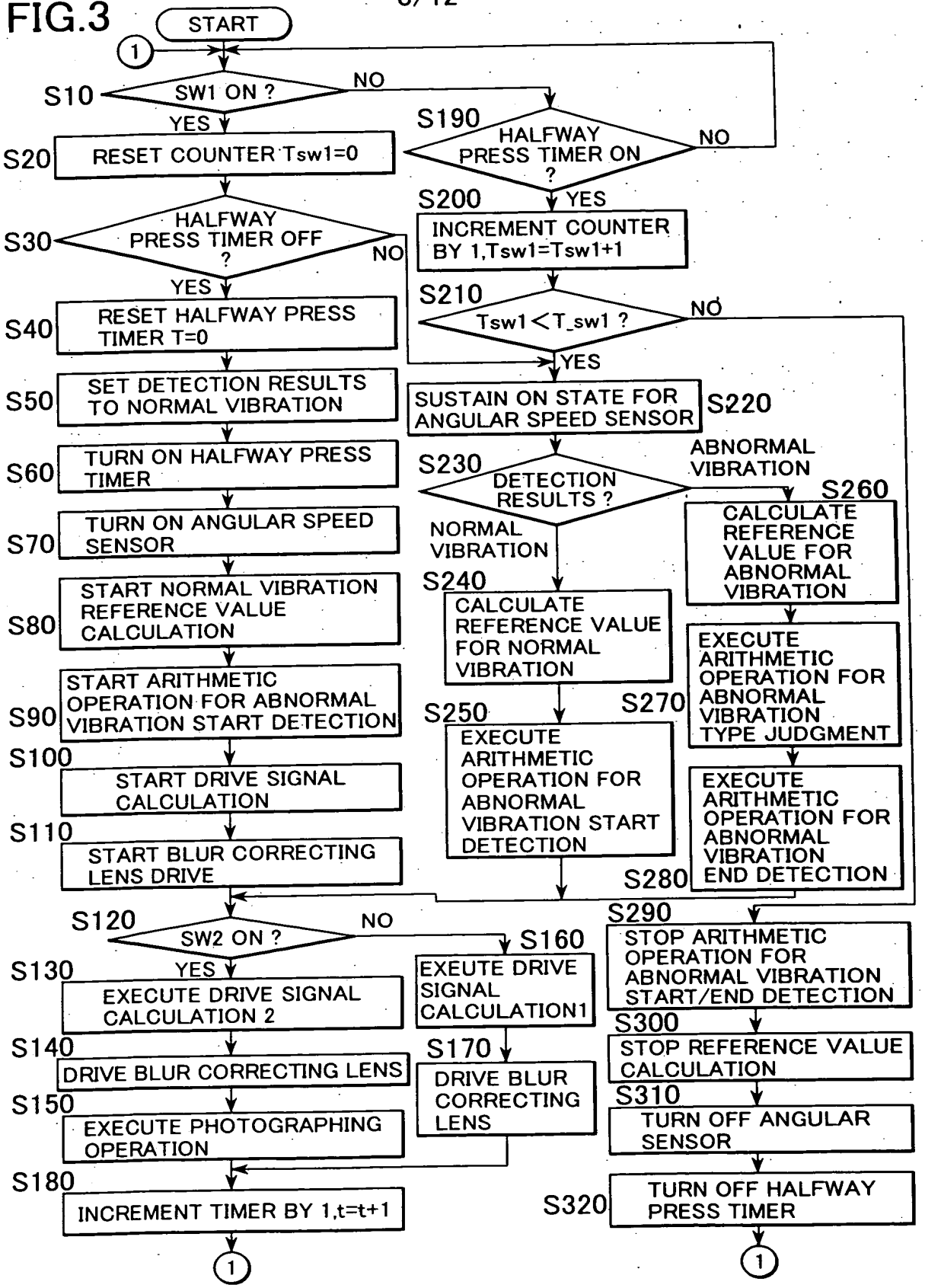

START
1
S10
SW1 ON ?
NO
YES
S20
RESET COUNTER Tsw1=0
S30
HALFWAY PRESS TIMER OFF ?
NO
YES
S40
RESET HALFWAY PRESS TIMER T=0
S50
SET DETECTION RESULTS TO NORMAL VIBRATION
S60
TURN ON HALFWAY PRESS TIMER
S70
TURN ON ANGULAR SPEED SENSOR
S80
START NORMAL VIBRATION REFERENCE VALUE CALCULATION
S90
START ARITHMETIC OPERATION FOR ABNORMAL VIBRATION START DETECTION
S100
START DRIVE SIGNAL CALCULATION
S110
START BLUR CORRECTING LENS DRIVE
S120
SW2 ON ?
NO
YES
S130
EXECUTE DRIVE SIGNAL CALCULATION 2
S140
DRIVE BLUR CORRECTING LENS
S150
EXECUTE PHOTOGRAPHING OPERATION
S180
INCREMENT TIMER BY 1,t=t+1
1
S190
HALFWAY PRESS TIMER ON ?
NO
YES
S200
INCREMENT COUNTER BY 1,Tsw1=Tsw1+1
S210
Tsw1<T_sw1 ?
NO
YES
S220
SUSTAIN ON STATE FOR ANGULAR SPEED SENSOR
S230
DETECTION RESULTS ?
NORMAL VIBRATION
ABNORMAL VIBRATION
S240
CALCULATE REFERENCE VALUE FOR NORMAL VIBRATION
S250
EXECUTE ARITHMETIC OPERATION FOR ABNORMAL VIBRATION START DETECTION
S260
CALCULATE REFERENCE VALUE FOR ABNORMAL VIBRATION
S270
EXECUTE ARITHMETIC OPERATION FOR ABNORMAL VIBRATION TYPE JUDGMENT
S280
EXECUTE ARITHMETIC OPERATION FOR ABNORMAL VIBRATION END DETECTION
S290
STOP ARITHMETIC OPERATION FOR ABNORMAL VIBRATION START/END DETECTION
S300
STOP REFERENCE VALUE CALCULATION
S310
TURN OFF ANGULAR SENSOR
S320
TURN OFF HALFWAY PRESS TIMER
1
S160
EXEUTE DRIVE SIGNAL CALCULATION1
S170
DRIVE BLUR CORRECTING LENS

FIG.4

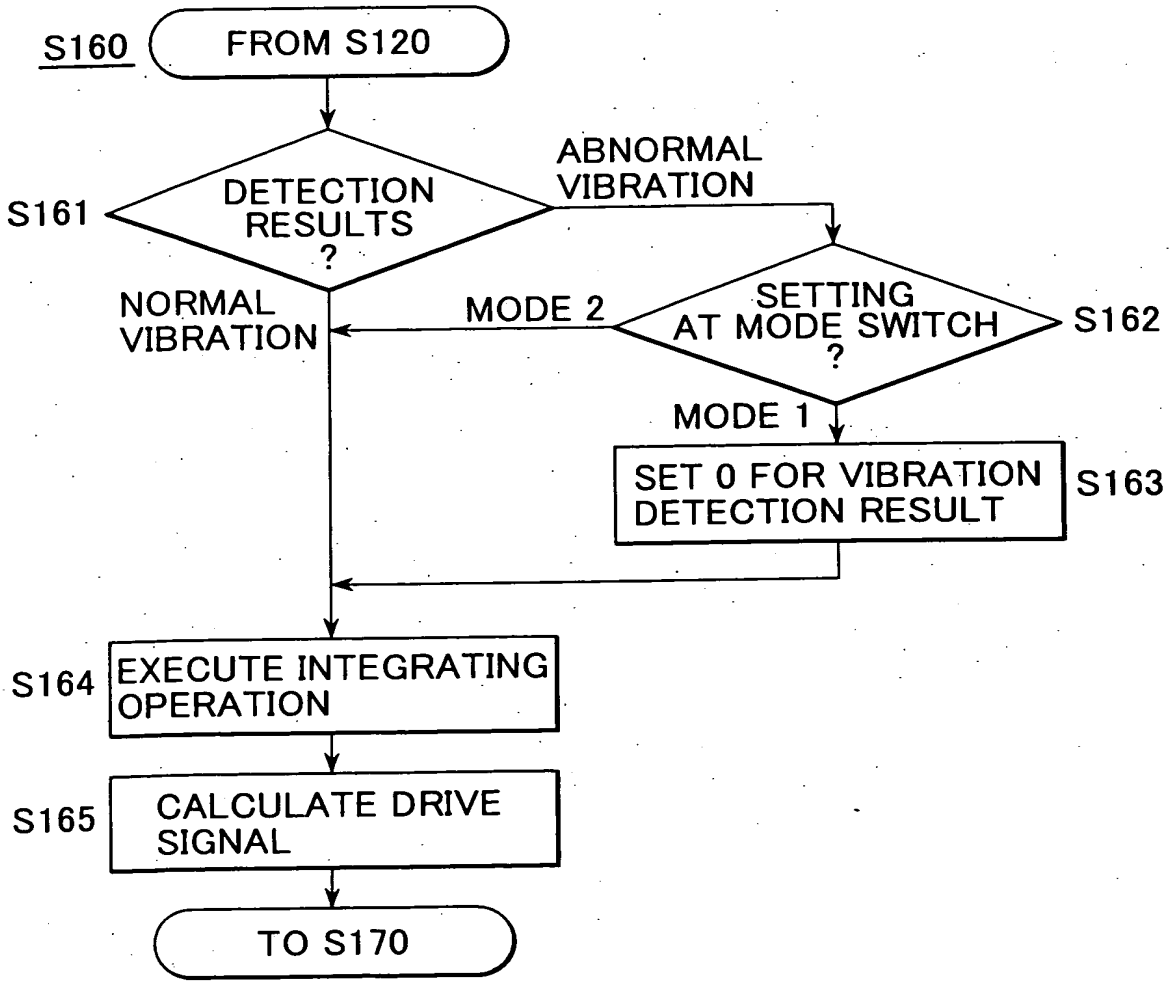

S160
FROM S120
S161
DETECTION RESULTS ?
ABNORMAL VIBRATION
NORMAL VIBRATION
MODE 2
SETTING AT MODE SWITCH ?
S162
MODE 1
SET 0 FOR VIBRATION DETECTION RESULT
S163
S164
EXECUTE INTEGRATING OPERATION
S165
CALCULATE DRIVE SIGNAL
TO S170

FIG.5

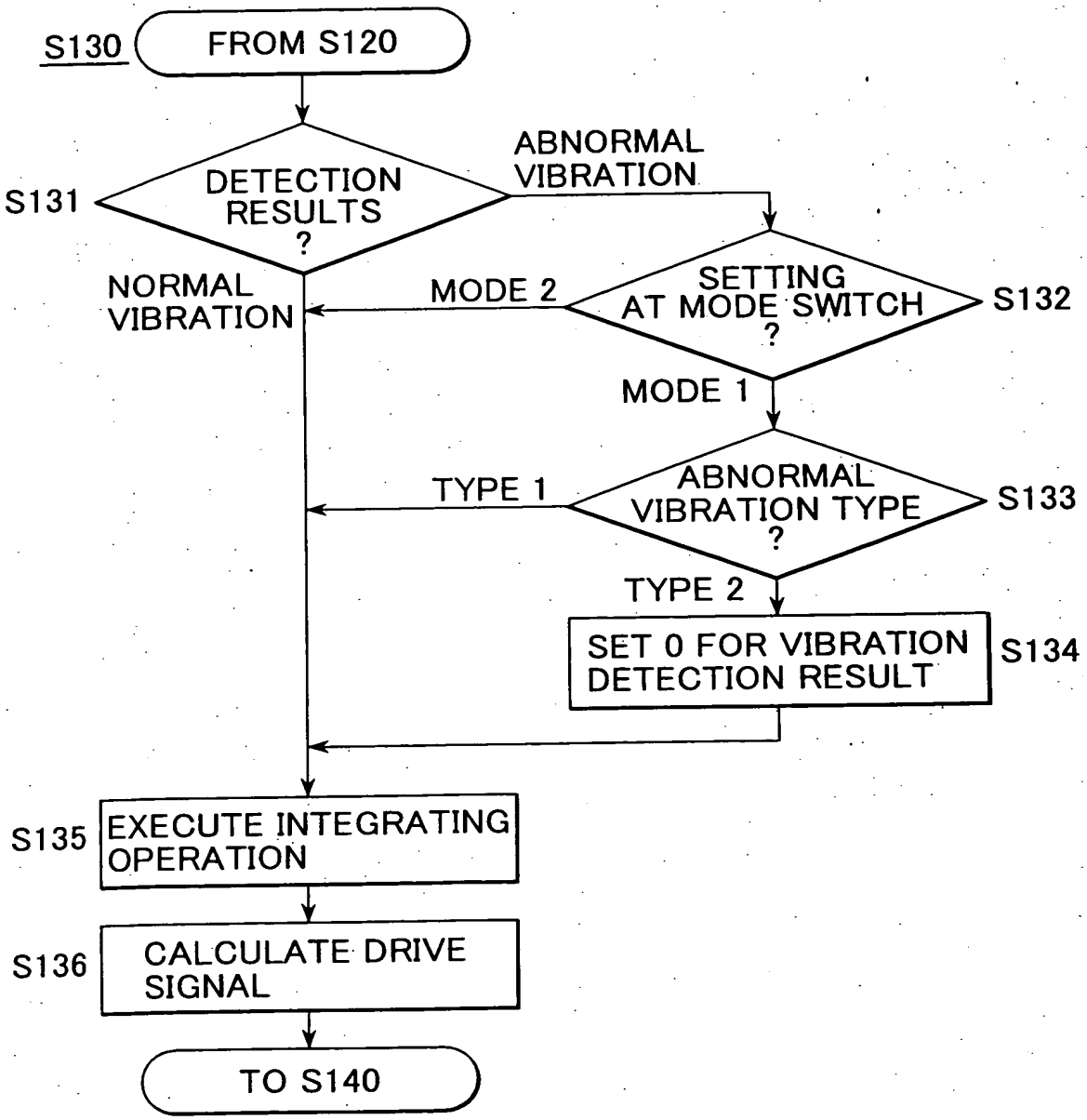
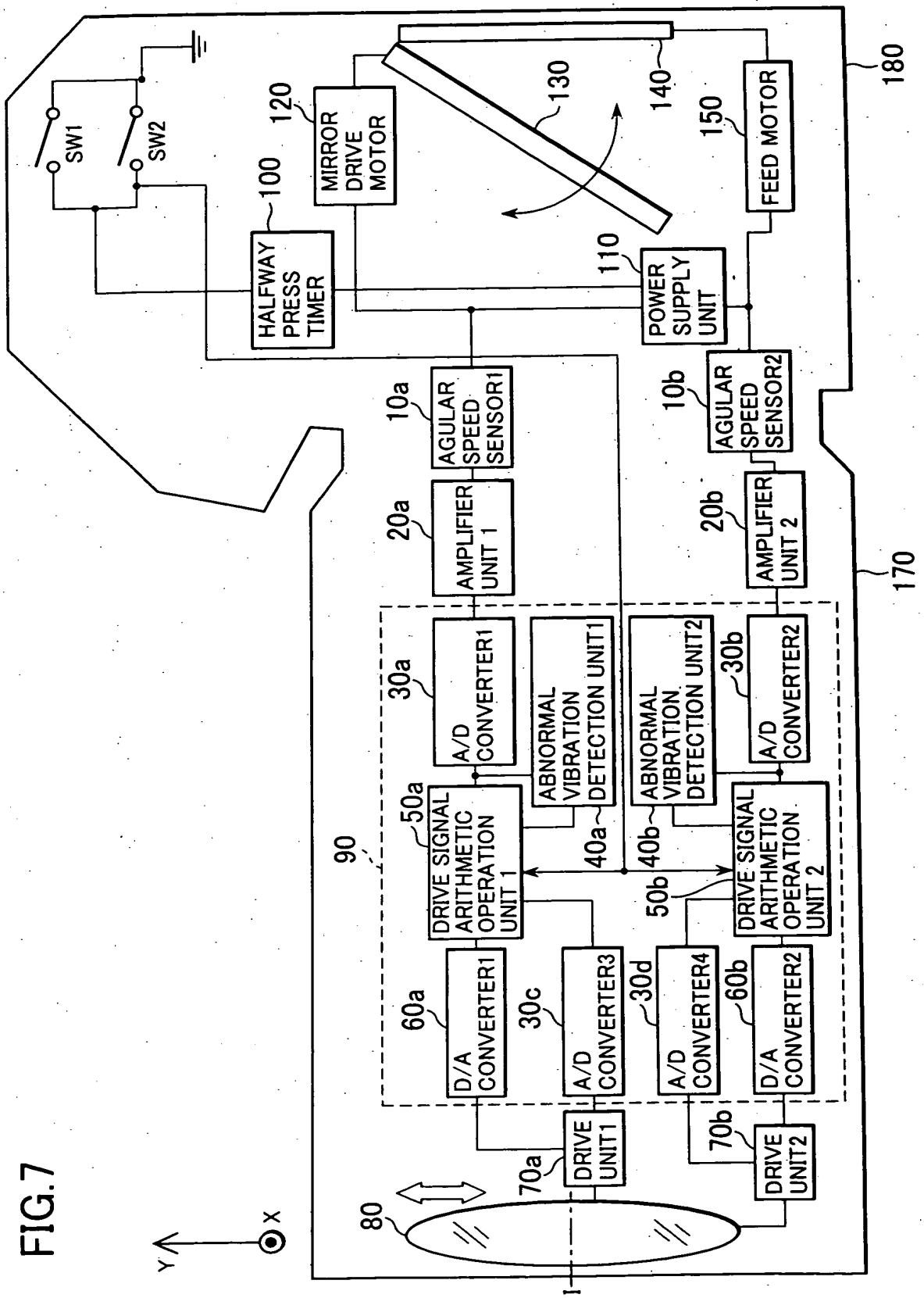

S130
FROM S120
S131
DETECTION RESULTS ?
ABNORMAL VIBRATION
NORMAL VIBRATION
MODE 2
SETTING AT MODE SWITCH ?
S132
MODE 1
TYPE 1
ABNORMAL VIBRATION TYPE ?
S133
TYPE 2
SET 0 FOR VIBRATION DETECTION RESULT
S134
S135
EXECUTE INTEGRATING OPERATION
S136
CALCULATE DRIVE SIGNAL
TO S140

FIG.6

		DETECTION RESULTS AT ABNORMAL VIBRATION DETECTION UNIT		
		NORMAL VIBRATION	ABNORMAL VIBRATION	
			(TYPE 1) RELATIVELY GENTLE PANNING USED ABOARD A VEHICLE	(TYPE 2) SWIFT PANNING
		REFERENCE VALUE FOR NORMAL VIBRATION	REFERENCE VALUE FOR ABNORMAL VIBRATION	
MODE SWITCH:MODE 1 NORMAL OPERATION, ETC. (STEADY FOOTING)	FULLY PRESSED (SW2:ON)	VIBRATION DETECTION SIGNAL NOT ALTERED (VIBRATION CORRECTION EXECUTED)	VIBRATION DETECTION SIGNAL NOT ALTERED (VIBRATION CORRECTION EXECUTED)	SET VIBRATION DETECTION SIGNAL TO 0 (VIBRATION CORRECTION STOPPED)
	HALFWAY PRESSED (SW2:OFF)		SET VIBRATION DETECTION SIGNAL TO 0 (VIBRATION CORRECTION STOPPED)	SET VIBRATION DETECTION SIGNAL TO 0 (VIBRATION CORRECTION STOPPED)
MODE SWITCH:MODE 2 ABOARD A VEHICLE (UNSTEADY FOOTING)	FULLY PRESSED (SW2:ON)	VIBRATION DETECTION SIGNAL NOT ALTERED (VIBRATION CORRECTION EXECUTED)		
	HALFWAY PRESSED (SW2:OFF)			

FIG.7


SW1
SW2
100
HALFWAY PRESS TIMER
120
MIRROR DRIVE MOTOR
130
140
150
FEED MOTOR
180
110
POWER SUPPLY UNIT
10a
AGULAR SPEED SENSOR1
10b
AGULAR SPEED SENSOR2
20a
AMPLIFIER UNIT 1
20b
AMPLIFIER UNIT 2
170
90
30a
A/D CONVERTER1
ABNORMAL VIBRATION DETECTION UNIT1
ABNORMAL VIBRATION DETECTION UNIT2
30b
A/D CONVERTER2
50a
DRIVE SIGNAL ARITHMETIC OPERATION UNIT 1
40a
40b
50b
DRIVE SIGNAL ARITHMETIC OPERATION UNIT 2
60a
D/A CONVERTER1
30c
A/D CONVERTER3
30d
A/D CONVERTER4
60b
D/A CONVERTER2
70a
DRIVE UNIT1
70b
DRIVE UNIT2
80
I
X
Y

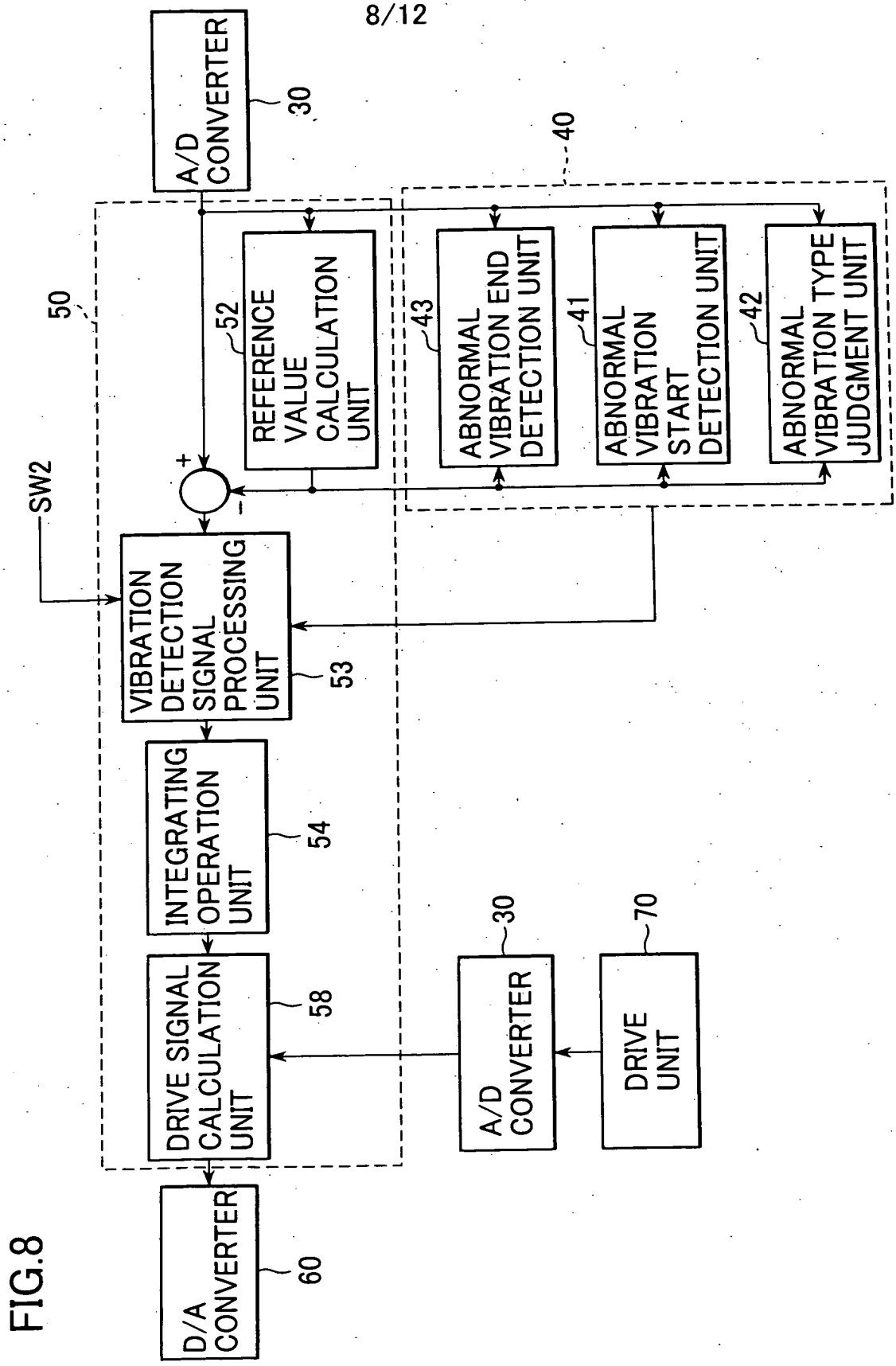

A/D CONVERTER
30
40
50
SW2
REFERENCE VALUE CALCULATION UNIT
52
ABNORMAL VIBRATION END DETECTION UNIT
43
ABNORMAL VIBRATION START DETECTION UNIT
41
ABNORMAL VIBRATION TYPE JUDGMENT UNIT
42
+
-
VIBRATION DETECTION SIGNAL PROCESSING UNIT
53
INTEGRATING OPERATION UNIT
54
DRIVE SIGNAL CALCULATION UNIT
58
A/D CONVERTER
30
DRIVE UNIT
70
D/A CONVERTER
60

FIG.8

FIG.9

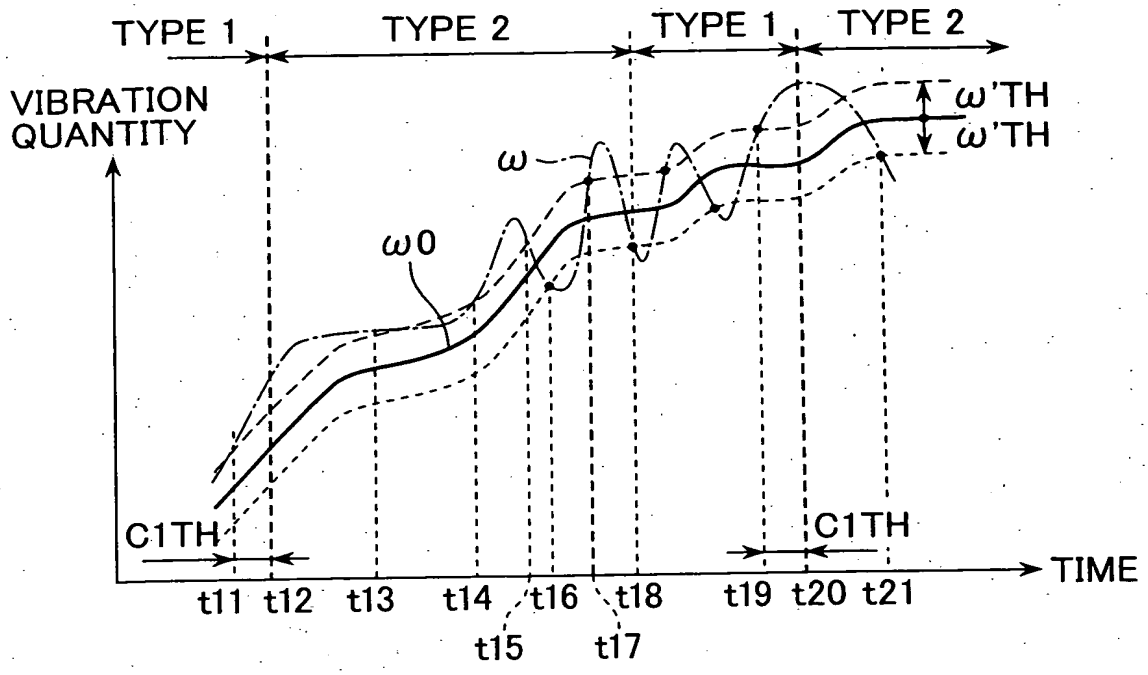

TYPE 1
TYPE 2
TYPE 1
TYPE 2
VIBRATION QUANTITY
ω'TH
ω'TH
ω
ω0
C1TH
C1TH
TIME
t11
t12
t13
t14
t15
t16
t17
t18
t19
t20
t21

FIG.10

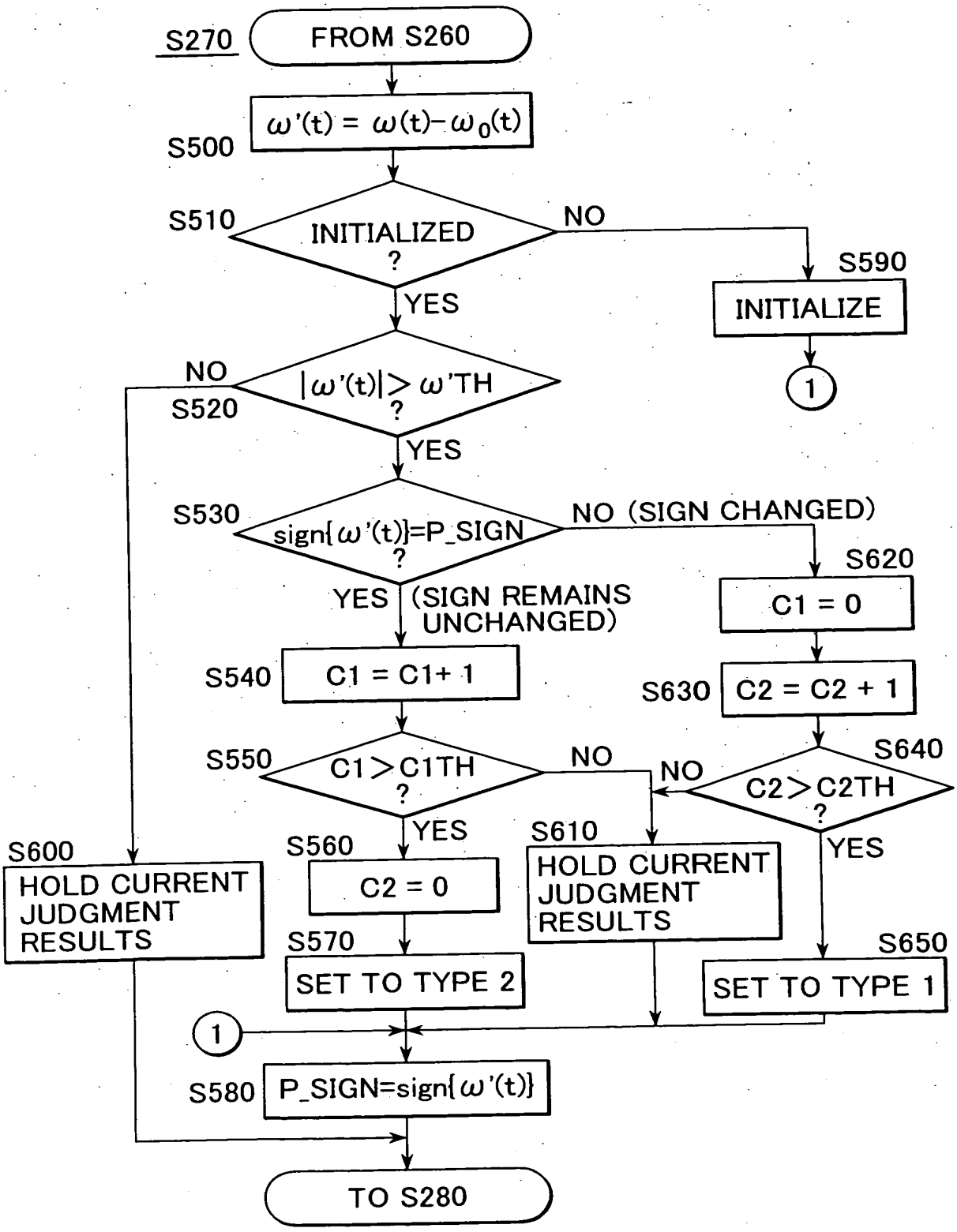
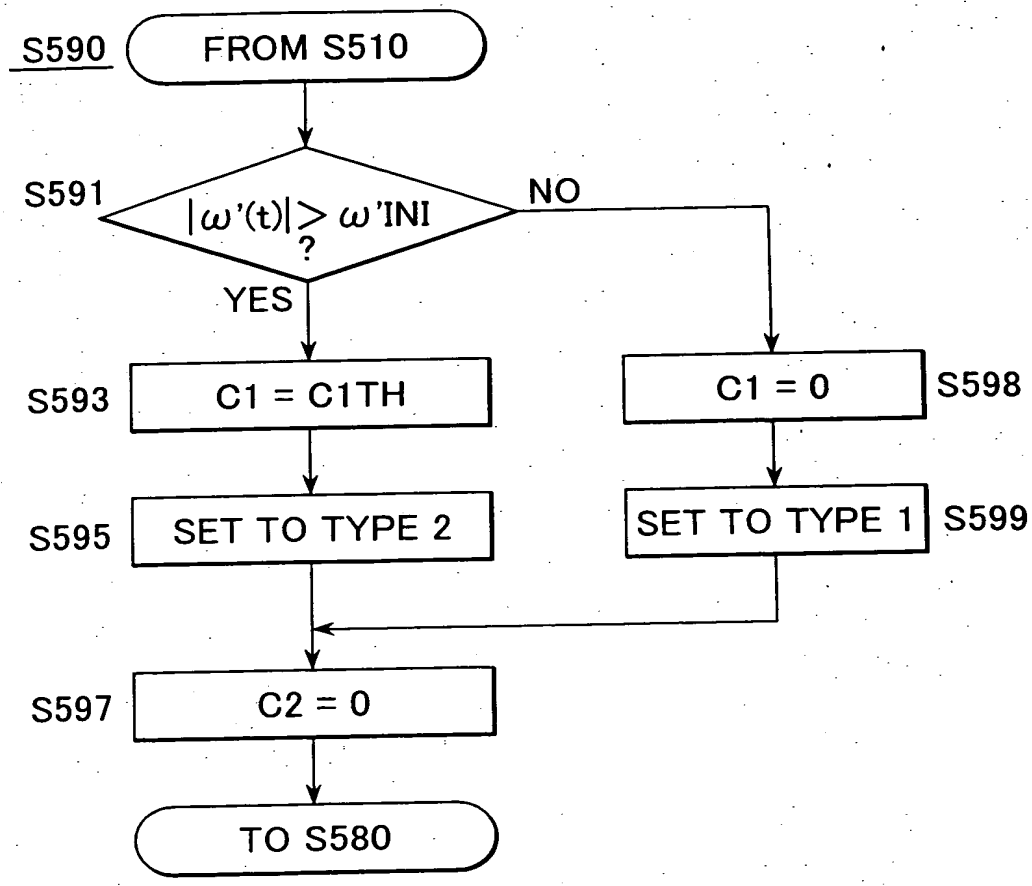

S270
FROM S260
S500
ω'(t) = ω(t)−ω0(t)
S510
INITIALIZED ?
NO
S590
INITIALIZE
1
YES
NO
S520
|ω'(t)| > ω'TH ?
YES
S530
sign{ω'(t)}=P_SIGN ?
NO (SIGN CHANGED)
S620
C1 = 0
YES (SIGN REMAINS UNCHANGED)
S540
C1 = C1+ 1
S630
C2 = C2 + 1
S550
C1 > C1TH ?
NO
NO
S640
C2 > C2TH ?
YES
YES
S600
HOLD CURRENT JUDGMENT RESULTS
S560
C2 = 0
S610
HOLD CURRENT JUDGMENT RESULTS
S570
SET TO TYPE 2
S650
SET TO TYPE 1
1
S580
P_SIGN=sign{ω'(t)}
TO S280

FIG.11


S590
FROM S510
S591
|ω'(t)| > ω'INI
?
NO
YES
S593
C1 = C1TH
C1 = 0
S598
S595
SET TO TYPE 2
SET TO TYPE 1
S599
S597
C2 = 0
TO S580

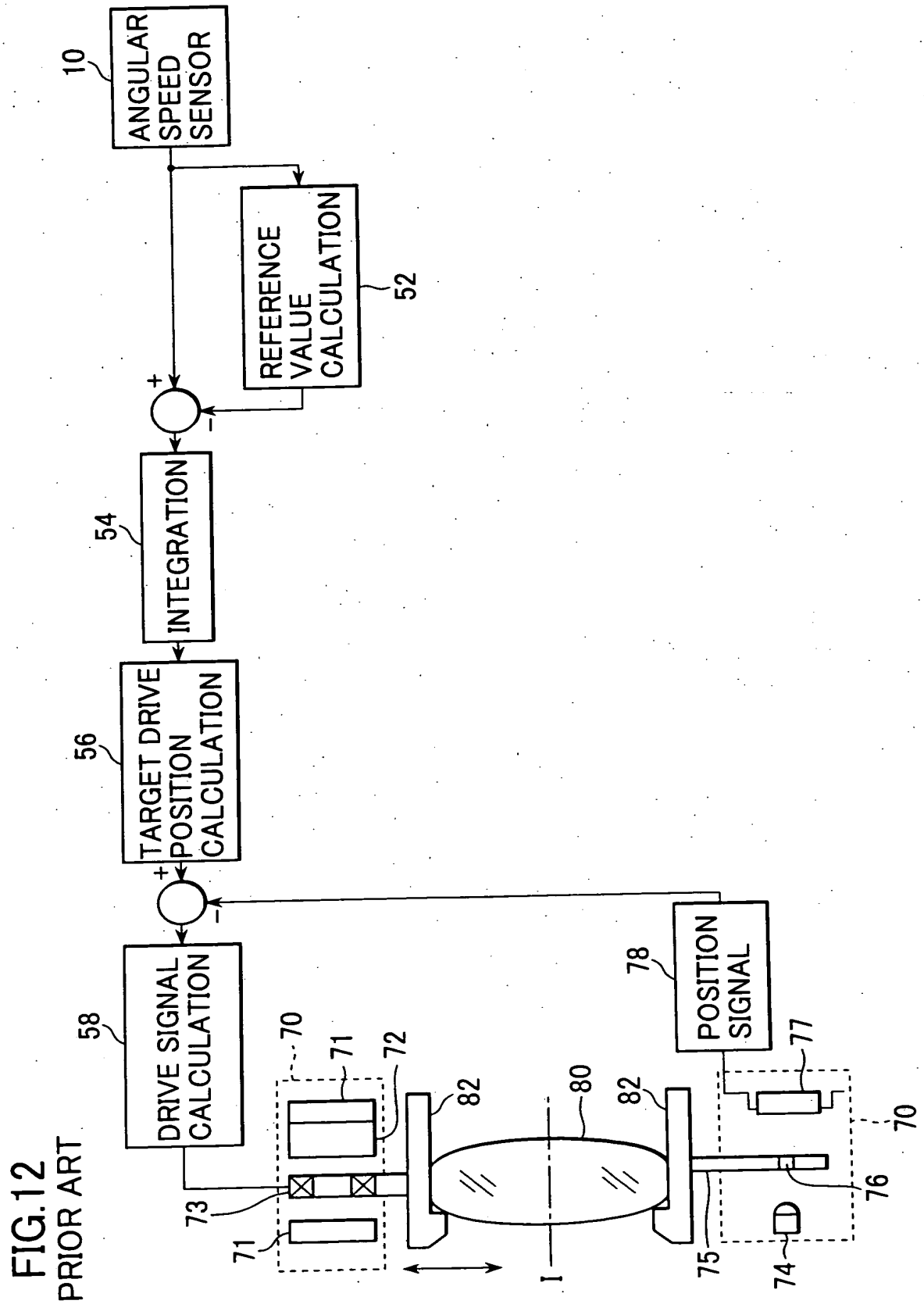


FIG.12
PRIOR ART